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SUBJ: HAZARDS OF VOLCANIC ASH

1. The recent eruption of Mt. St. Helens in Washington State and the prospects of other imminent eruptions focus needed attention on a very serious hazard--airborne volcanic ash. Normally, ash will be localized and can be avoided with careful attention and planning by aircrews and weather briefers. However, when ash is present at upper flight levels, unpredictable global dispersal can occur and play havoc with air traffic. For example, when Mt. Redoubt erupted in Alaska in 1989, a Boeing 747-400 suffered a four-engine flameout and severe damage when it encountered an ash cloud. After Mt. Pinatubo erupted in 1991, at least 15 aircraft reported significant damage in spite of widespread warnings. Following the last Mt. St. Helens event, a C-130 inadvertently penetrated an ash plume 2.5 hours after the second major eruption. The C-130 sustained extensive damage and recovered with only two of its engines still operating. In 1997, Mt. Popocatepetl erupted in Mexico. Several aircraft experienced minor damage from this eruption through 1998. One aircrew experienced such reduced visibility for landing that they had to use the side windows on the flight deck in order to taxi after landing. The main point is this: Volcanic ash is a formidable menace and aircrews must take deliberate avoidance measures to escape its effects.

2. The following information should help you avoid ash.

a. Flight planning in the vicinity of volcanic activity.

(1) Contact base weather for current and forecast ash cloud positions--and stay at least 20NM away. If possible, maneuver upwind of a volcanic plume, even when flying outside 20NM.

(2) Carefully review NOTAMS and Air Traffic Control directives for current status, to include Volcanic Ash Advisory Statements (VAAS) recently developed by ICAO.

(3) Avoid destinations in areas of ash fallout.

b. Preflight in a volcanic ash covered environment. Carefully inspect the following areas:

(1) Pitot tubes and static ports.

(2) Engine and ventilation inlets.

(3) Air scoops.

(4) Gear strut and hydraulic actuator chrome. NOTE: Do not wipe, rub, or walk on ash-coated surfaces (i.e. – top of fuselage, wings and/or horizontal stabilizer). Do not use windshield wipers to remove dust. Flush off with water and wipe with a soft cloth.

c. Ground operations in a volcanic ash covered environment.

(1) Minimize operations.

(2) Do not use the auxiliary power unit for air conditioning. Restrict use to engine starts.

(3) Once engines are started, use engine bleed for air conditioning.

(4) Run air conditioning at full cold setting if dust becomes visible.

(5) Do not use air conditioning packs during takeoff.

(6) If odors become present, minor eye irritation can be expected. Remove contact lenses and consider the use of oxygen when odors or eye irritation occur.

(7) Minimize thrust during taxi.

(8) If possible, perform a rolling takeoff.

d. Flight Operations. Airborne radar will not detect volcanic dust clouds, weather forecasts are occasionally wrong, and other clouds may hide plumes. In IMC or at night, it may be difficult to determine if you're in an ash cloud or in regular clouds. It is for reasons like this that

the International Civil Aviation Organization (ICAO) spearheaded an effort to make information on volcanic hazards to aircraft more readily available. The ICAO has established Volcanic Ash Advisory Centers (VAAC) that issue Volcanic Ash Advisory Statements (VAAS) to aircrews. The VAASs provides critical information for flight. However, in the event that aircrews still enters an ash cloud inadvertently, some tell-tale signs that you are in an ash cloud are:

(1) Windscreens are frequently pitted so severely that they become translucent. In addition, the abrasive cloud particles will sandblast the aircraft.

(2) Airspeed indication may fluctuate greatly or appear unusually high or low due to volcanic dust blocking the pitot static system. Be prepared with known pitch/power settings IAW the performance manual for "Flights with Unreliable Airspeed."

(3) An acrid odor similar to electrical smoke may be present.

(4) A rise in oil temperature could indicate dust-plugged oil cooler(s).

(5) Increasing EGT.

(6) Torching from the tail pipe.

(7) Volcanic ash/dust may be blown into the cockpit through the air conditioning system.

(8) At night, St. Elmo's fire and static discharges around the windshield are often visible. A bright orange glow in engine inlets frequently occurs.

(9) At night, or in dark clouds, landing lights cast dark distinct shadows in ash clouds (unlike the fuzzy, indistinct shadows that are cast against weather clouds).

(10) Engines may surge, and/or lose thrust as a result of dust buildup and blockage of the high pressure turbine nozzle guide vanes and the high pressure turbine cooling holes.

(11) At first encounter, select idle power, if the situation permits. This will minimize erosion, glazing, and dust buildup. Consider an immediate 180-degree turn to get back to clear air.

(12) With prolonged exposure, engines may flame out due to erosion, blockage, or air starvation. Follow restart guidance. Be prepared for delayed start and spool-up.

(13) After a suspected encounter, advise the nearest air traffic control agency. Transmit PIREPs to the nearest military base via PMSV. This is extremely important for timely warning to other aircrews.

e. Landing in a volcanic ash covered environment.

(1) Ash may act similar to dry snow or loose sand. In dry conditions, it is subject to vortices from engines, which may cause ingestion and subsequent damage. In wet conditions, ash-covered ramps, taxiways and runways should be treated as icy surfaces with appropriate operating techniques and precautions applied. Contact base ops or base weather for current runway conditions. If windshields are pitted beyond use, perform an instrument approach with a safety chase. Request the widest runway and declare an IFE.

(2) These additional precautions should be taken:

(a) Damaged landing lights will significantly reduce landing light effectiveness; therefore, have the runway lights (not strobes) turned full up.

(b) Limit reverse thrust to the minimum practical after landing.

(c) Minimize ground operations and taxi thrust.

(d) Consider clearing the active runway and having the aircraft towed.

3. Finally, if you inadvertently fly into ash, or suspect you have, make an appropriate entry in the 781A. Record altitude, location, duration of exposure, and any related malfunctions observed. Maintenance considerations following exposure to volcanic ash include the following:

a. Aircraft inspections should be conducted IAW T.O. with the following additional considerations:

(1) Ash should be removed at the earliest opportunity. Do not wipe, rub, or walk on ash-coated surfaces. Clean with water, wash using alkaline detergent (ash is acidic) and flood with water.

(2) Air, oil, fuel filters, and electrical generators should be checked more frequently.

b. Reduce time between oil change intervals.

c. Clean/replace air conditioning water separator bags.

d. Pitot static systems should be cleaned by reverse blow out.

e. Externally lubricated mechanisms like control cables, actuator rods, etc., should be wiped with a soft cloth. Avoid use of solvents.

f. Increase sumping frequency of fuel tanks.

g. Increase inspections for landing gear squat switch cables.

h. Consult engine manufacturer for specific powerplant maintenance items.

4. For additional information consult the ICAO Handbook on the International Airways Volcano Watch (IAVW) at the following website:

www.icao.int/icaonet/dcs/9766_1_en.pdf